Contents: Lifting Safety

Effective Date: **April 2004**
Point of Contact: Lifting Safety Committee Chair

Section	Overview of Content (see section for full process)
Introduction	
1. Conducting Critical and Pre-engineered Lifts	✍ Conduct lift assessment. ✍ Prepare Critical Lift Evaluation Form (CLEF) and a Critical Lift Plan or Pre-engineered Lift Procedure. ✍ Review and approve plan. ✍ Hold Pre-lift Meeting. ✍ Conduct lift.
2. Conducting Ordinary Lifts and Operating Material Handling Equipment	✍ Determine type of lift by conducting a lift assessment. ✍ Evaluate lift. ✍ Ensure training is complete. ✍ Ensure equipment is certified. ✍ Present plan for review. ✍ Start activity when work package is complete and accepted. ✍ Keep nonparticipants out of work control zone. ✍ Approve work planning. ✍ Hold Pre-lift Meeting. ✍ Conduct lift.
3. Certifying Material	✍ Inspect and certify (load test) new

3. Certifying Material Handling Equipment for Use	✍ Inspect and certify (load test) new equipment not certified by the manufacturer. ✍ Review and inspect lifting device. ✍ Issue certification document. ✍ Retain copy of records.
4. Inspecting and Maintaining Lifting and Material Handling Equipment	✍ Inspect and maintain lifting and material handling equipment applying one of the following subprocesses: ✍ Frequent Inspections ✍ Periodic Inspections and Load Tests ✍ Inspecting Contractor's Equipment ✍ Maintaining Lifting and Material Handling Equipment
5. Inspecting Shielding Blocks	✍ Inspect and protect shielding blocks. ✍ Discard defective blocks.

Definitions

Exhibits

AGS Shielding Block 24' x 2' Roof Beam
Checklist for Lift Planning
Classifying Lifts
Criteria for Resubmittal of Pre-engineered Lifts
Critical Lift Plan and Pre-engineered Lift Procedure
Lift Assessment
Weather Factors

Forms

Critical Lift Evaluation Form (CLEF)
Electric (DC) Motor Forklift

Forklift
Inspection Reports
Internal Combustion Engine Forklift
Load Test Report
Rigging Plan Worksheet
Safety Awareness Certificate (SAC)

Training Requirements and Reporting Obligations

This subject area contains training requirements. See the Training and Qualifications Web Site.

This subject area does not contain reporting obligations.

References

ALARA Program Subject Area

ASME B30.20 Standard for Design, Testing, and Appropriate Markings

DOE-STD-1090-2001, Hoisting and Rigging

ES&H Standard 1.6.0, Material Handling: Equipment & Procedures

Preventive Maintenance Program, Plant Engineering Division website

Training and Qualifications Web Site

Work Planning and Control for Experiments and Operations Subject Area

Standards of Performance

Managers shall analyze work for hazards, authorize work to proceed, and ensure that work is performed within established controls.

Managers shall develop, maintain, communicate, and manage appropriate plans, i.e., project plans, program plans, operations plans, and business plans.

All staff and users shall ensure that they are trained and qualified to carry out their assigned responsibilities, and shall inform their supervisor if they are assigned to perform work for which they are not properly trained or qualified.

Management System

This subject area belongs to the **Worker Safety and Health** management system.

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Introduction: Lifting Safety

Effective Date: **April 2004**

Point of Contact: Lifting Safety Committee Chair

This subject area describes the procedures for conducting ordinary, pre-engineered, and critical lifts. It discusses the requirements for

- Conducting a lift assessment to determine the type of lift;
- Preparing a Critical Lift Evaluation Form (CLEF) and a Critical Lift Plan or Pre-engineered Lift Procedure;
- Reviewing and approving the plan;
- Conducting ordinary lifts and operating material handling equipment;
- Certifying material handling equipment;
- Inspecting and maintaining lifting and material handling equipment;
- Inspecting shielding blocks.

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Subject Area: ***Lifting Safety***

1. Conducting Critical and Pre-engineered Lifts

Effective Date: **April 2004**

Point of Contact: Lifting Safety Committee Chair

Applicability

This information applies to BNL staff and non-BNL staff who make critical and pre-engineered lifts.

Required Procedure

Before a critical or pre-engineered lift is made, the Critical Lift Evaluation Form (CLEF) must be prepared. The Critical Lift Plan also must be prepared and reviewed. A Pre-engineered Lift Procedure must follow the format of a Critical Lift Plan.

However, in a life-threatening, or emergency situation, the Incident Commander will take charge of the emergency and will secure input from the Lifting Safety Committee Chair, subject matter experts, Plant Engineering supervisors, or Plant Engineering Hoisting and Rigging Inspector, if available, and the situation warrants it.

Step 1	The responsible manager or designee determines the type of lift by conducting a lift assessment: ✍ Ordinary; ✍ Pre-engineered; ✍ Critical. See the exhibits Lift Assessment and Classifying Lifts for information on conducting the assessment. If the lift is ordinary, go to the section Conducting Ordinary Lifts and Operating Material Handling Equipment. If the lift is critical or pre-

	engineered, follow this section. Contact the Lifting Safety Committee (LSC) Chair, Plant Engineering Rigging Supervisors, or Plant Engineering Hoisting and Rigging Inspector for assistance in conducting the assessment.
Step 2	The responsible manager or designee (e.g., professional engineer, person-in-charge) prepares the Critical Lift Evaluation Form (CLEF) for critical or pre-engineered lifts. This may be done in conjunction with Step 4.
Step 3	The responsible manager or designee ensures that the operator of the equipment has been trained. See the Training and Qualifications Web Site for information on courses. Contact a Training Coordinator for assistance.
Step 4	The responsible manager or designee prepares a Critical Lift Plan or Pre-engineered Lift Procedure. See the exhibit Critical Lift Plan and Pre-engineered Lift Procedure for the information required for developing it. Use the exhibits Checklist for Lift Planning and Weather Factors as tools for preparing the plan.
Step 5	The responsible manager or designee (or the contractor, if applicable) presents the Critical Lift Evaluation Form (CLEF) and the Critical Lift Plan or Pre-engineered Lift Procedure to the LSC for review. A critical lift must not be conducted without this review. The LSC Chair assists the Deputy Director for Operations in deciding to authorize any lift meeting the criteria for a critical Lift. **Note:** The responsible manager or designee (or the contractor, if applicable) should allow an adequate amount of time in the construction schedule for review and approval of critical or pre-engineered lifts.
Step 6	The LSC reviews the CLEF and the Critical Lift Plan or Pre-engineered Lift Procedure and submits it to the Deputy Director for Operations for final approval. Use the exhibit Checklist for Lift Planning as a tool for reviewing the plan. **Note:** The LSC may waive some requirements that become burdensome due to local circumstances. The LSC also may contract a third-party to review the plan.
Step 7	The professional engineer/qualified person, person-in- charge (as

	applicable), operator of equipment (as applicable), responsible manager or designee, and LSC Committee Chair sign the CLEF. **Note:** The LSC Chair retains the original signed copy. The person-in-charge retains a copy of the executed CLEF.
Step 8	The Deputy Director for Operations reviews the CLEF and the Critical Lift Plan or Pre-engineered Lift Procedure and gives final approval for critical lifts and pre-engineered lifts on the recommendation of the LSC.
Step 9	Staff participating in the lift hold a Pre-lift Meeting to review the plan/procedure before making a critical or pre-engineered lift.
Step 10	Conduct the lift as planned. If there are any problems during a lift that cause a departure from the lifting plan, abort the lift, redo the planning and review, and conduct the lift at another time.
Step 11	Resubmit changes to pre-engineered lifts for approval by the LSC (see the exhibit Criteria for Resubmittal of Pre-engineered Lifts). Submit the updated Pre-engineered Lift Procedure reading acknowledgement forms to the LSC for record retention.

References

Training and Qualifications Web Site

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2. Conducting Ordinary Lifts and Operating Material Handling Equipment

Effective Date: **April 2004**

Point of Contact: Lifting Safety Committee Chair

Applicability

This information applies to BNL staff and non-BNL staff who conduct ordinary lifts or operate material handling equipment.

Required Procedure

Before conducting an ordinary lift and/or operating material handling equipment to complete work, consult the Classifying Lifts exhibit and prepare a Lift Assessment. All ordinary lifts requiring the use of material handling equipment must follow work planning procedures (see the Work Planning and Control for Experiments and Operations Subject Area).

However, in a life-threatening, or emergency situation, the Incident Commander will take charge of the emergency and will secure input from the line authority having jurisdiction, the Lifting Safety Committee Chair, subject matter experts, Plant Engineering Rigging Supervisors, or Plant Engineering Hoisting and Rigging Inspector, if available, and the situation warrants it.

Step 1	The responsible manager or designee determines the type of lift by conducting a lift assessment: ✍ Ordinary; ✍ Pre-engineered; ✍ Critical. See the exhibits Lift Assessment and Classifying Lifts for information on conducting the assessment.

	If the lift is ordinary, follow this section. If the lift is critical or pre-engineered, refer to the section Conducting Critical and Pre-engineered Lifts. Contact the Lifting Safety Committee (LSC) Chair, Plant Engineering Rigging Supervisors, Plant Engineering Hoisting and Rigging Inspector, or your ESH Coordinator for assistance in conducting the assessment.
Step 2	The responsible manager or designee (e.g., professional engineer, person-in-charge) evaluates the proposed lift or material handling requirement in accordance with work planning requirements and authorizes the activity or lift (see the Work Planning and Control for Experiments and Operations Subject Area). This may be done in conjunction with step 4.
Step 3	The responsible manager or designee ensures all personnel performing rigging activities and the operator of the equipment have completed the Basic Rigging Course. See the Training and Qualifications Web Site for course information. Contact a Training Coordinator for assistance.
Step 4	The responsible manager or designee ensures the equipment to be used is certified for use (go to the section Certifying Material Handling Equipment for Use) and inspected (go to the section Inspecting and Maintaining Lifting and Material Handling Equipment) by designated BNL staff (or the contractor, if applicable) with proper credentials. Use the exhibits Checklist for Lift Planning and Weather Factors as tools for preparing the work plan. Contractors working at BNL must submit a Rigging Plan Worksheet to the Plant Engineering Hoisting and Rigging Inspector. A minimum of four (4) working days is required for review and approval of the Rigging Plan. The Rigging Plan, and all lifting and rigging equipment must be approved by the Plant Engineering Hoisting and Rigging Inspector prior to use at BNL.
Step 5	The responsible manager or designee (or the contractor, if applicable) presents the plan to the supervisor or cognizant person-in-charge for review with the person(s) who will perform the task(s) using the material handling equipment, noting the precautions required to safely complete the task(s). **Note:** The responsible manager or designee (or the contractor, if applicable) should allow an adequate amount of time in the schedule to permit load testing and feedback to be addressed as needed.
Step 6	Commence the activity once the work package is complete and accepted, and the material handling equipment meets inspection requirements, and

	and the material handling equipment meets inspection requirements, and qualified operators are determined. **Note:** In certain situations, it may be prudent to have experienced personnel present when the activity commences. **Note:** If the intended work is to be done by "qualified personnel," the responsible line organization should make that part of the plan and verify that such personnel are performing the work.
Step 7	From the onset of the work activity, whether it is a hoisting and rigging operation, a forklift operation, or other operation, the work crew must keep nonparticipants out of the work control zone (danger zone), whether indoors or outdoors.
Step 8	Line management approves work planning and related activities (see the Work Planning and Control for Experiments and Operations Subject Area. Contractors must obtain approval from the Plant Engineering Hoisting and Rigging Inspector. BNL staff must obtain approval from the responsible manager. **Note:** Records are to be maintained by line management.
Step 9	Staff participating in ordinary lifts hold a Pre-lift Meeting to review the plan/procedure before making any lift of personnel or equipment.
Step 10	Conduct the lift as planned. If there are any problems during a lift that cause a departure from the lifting plan, abort the lift, redo the planning and review, and conduct the lift at another time.

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Work Planning and Control for Experiments and Operations Subject Area

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3. Certifying Material Handling Equipment for Use

Effective Date: **April 2004**

Point of Contact: Lifting Safety Committee Chair

Applicability

This information applies to BNL staff and non-BNL staff who use material handling equipment.

Required Procedure

After evaluating the task to be completed and determining that the lift will be ordinary, it will be necessary to certify that the proper material handling equipment will be used. All newly purchased lifting devices and accessories must be tested and certified by the manufacturer, as required by applicable codes, standards and/or regulations, and must have an identification plate attached with all of the required information and an operator's manual available, as applicable.

Step 1	Prior to use, inspect and certify (load test) any newly purchased equipment not certified by the manufacturer. Contact the Safety Engineering Group or Plant Engineering Hoisting and Rigging Inspector for inspection and load testing documentation. (see Load Test Report).
Step 2	Prior to use, the responsible organization reviews and inspects any lifting device that has undergone a major overhaul or modification, or shows deterioration.
Step 3	The Safety Engineering Group or Plant Engineering issues a certification document and retains a copy of the records.

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Subject Area: ***Lifting Safety***

4. Inspecting and Maintaining Lifting and Material Handling Equipment

Effective Date: **April 2004**

Point of Contact: Lifting Safety Committee Chair

Applicability

This information applies to BNL staff and non-BNL staff who use lifting and/or material handling equipment

Required Procedure

Inspecting and Maintaining Lifting and Material Handling Equipment contains four subsections:

4.1 Inspecting Lifting and Material Handling Equipment

Step 1	**Frequent Inspections:** Before each use, the operator or other qualified individual designated by the line manager or the person-in-charge (PIC), or other cognizant BNL person with authority performs a visual inspection of the equipment (including the object[s] being lifted). Inspection guides for most equipment are provided (see the exhibit Inspection Reports) and must be used by the operator and maintained with the equipment (in a weatherproof-holder, if applicable).

	Written records of these inspections are at the discretion of line management, unless a safety deficiency is found. A record of the safety deficiency is required and must be maintained along with the record of corrective measures. These deficiencies must be reported to the operator's supervisor or person-in-charge (PIC). If this is BNL equipment, the supervisor informs the Plant Engineering Maintenance Management Center (MMC) of any deficiencies that may require attention. Deficiencies on contractor-owned or leased equipment must be repaired and approved or the equipment will not be allowed to operate at BNL.

4.2 Periodic Inspections and Load Tests

Step 1	**Periodic Inspections and Load Tests:** The Plant Engineering Hoisting and Rigging Inspector performs a formal visual inspection of BNL equipment and completes an inspection report (see the exhibit Inspection Reports). The Plant Engineering Division maintains the inspection reports on file.
Step 2	If deficiencies are found, the Plant Engineering Hoisting and Rigging Inspector submits a copy of the report to the cognizant line manager or designee responsible for corrective measures. The Hoisting and Rigging Inspector maintains the inspection report and corrective actions on file for five years. The required frequency of inspections and load tests are: a. All equipment must be formally inspected at least once every 12 months and informally inspected before each use. b. After a major overhaul or modification, which may affect stability, mechanical, hydraulic, or the safe operation of the equipment, the equipment must be formally inspected and a load test must be performed (see the section Certifying Material Handling Equipment for Use).

4.3 Inspection of Contractor's Equipment

Step 1	Contractors must inspect their equipment daily.
Step 2	Before a contractor's equipment may be used on-site, the Plant Engineering Hoisting and Rigging Inspector or designee verifies the equipment has been

	Hoisting and Rigging Inspector or designee verifies the equipment has been inspected and maintained. **Note:** The Hoisting and Rigging Inspector should be given a minimum of 48 hours notice to inspect a contractor's equipment before its use on-site.

4.4 Maintaining Lifting and Material Handling Equipment

Step 1	BNL organizations that possess lifting and/or material-handling equipment ensure its maintenance is documented in the Plant Engineering Division's Preventive Maintenance Program.
Step 2	The user determines the methods and frequency of the maintenance, based on the manufacturer's recommendations.
Step 3	All contractors, subcontractors, and BNL equipment operators ensure the equipment under their control is maintained in accordance with the applicable OSHA, ANSI, and DOE standards, and that operating manuals are stored with the equipment.
Step 4	A qualified engineer must give approval for any modification to BNL equipment, with concurrence from Plant Engineering and the Safety Engineering Group. **Note:** Modifications that affect the stability, mechanical, hydraulic, or electrical integrity, or safe operation of lifting equipment cannot be made without the written consent of the manufacturer.

References

Preventive Maintenance Program, Plant Engineering Division website

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5. Inspecting Shielding Blocks

Effective Date: **April 2004**

Point of Contact: Lifting Safety Committee Chair

Applicability

This information applies to BNL staff and non-BNL staff who use lifting and/or material handling equipment.

Required Procedure

For those operations where shielding blocks are routinely used, it is required that each organization appoint a committee with the responsibility for periodically inspecting shielding blocks.

Step 1	The line organization forms a committee with the responsibility for periodically inspecting shielding blocks, setting standards for lifting methods, and developing procedures for use. The line organization designates one individual as responsible for inspecting shielding received from sources outside the Laboratory and responsibility for reviewing the design of new shielding, and for developing lug testing procedures if required. Shielding blocks must be designed by a qualified engineer, approved by the line organization, and reviewed by the Safety Engineering Group. A system similar to the one described in the exhibit AGS Shielding Block 24' x 2' Roof Beam must be designed and used whenever shielding blocks are required.
Step 2	Protect all shielding blocks in storage or use with permanent lifting fixtures (including the lifting rings and hardware) against snow and ice damage. Whenever

	feasible, incorporate self-draining features in new designs.
Step 3	**Block Inspections:** Before a block is picked, inspect it for questionable conditions such as: a. Cracks, especially along the edges or near corners; b. Surface flaking of concrete; c. Lifting rings or hardware rusted more than 10% of thickness; or d. Lifting rings made out of rebar, bent or damaged lifting rings, or hardware. If blocks are found in an unsafe condition, cut out their lifting rings or hardware, and dispose of them properly. Lift unsafe blocks with nylon slings used in a choker or basket configuration.
Step 4	Discard blocks when they are found to have one or more of the following defects: a. Extensive cracking near the lifting ring or hardware; b. Flaking of concrete, causing pieces (weighing more than ½ pound) to fall; c. Lifting rings or hardware rusted more than 20% of thickness; for load supporting hooks only a 10% reduction is maximum. d. Ballooning of block due to internal expansion; or e. Badly bent or damaged lifting rings or hardware. **Note:** If a block is considered unsafe, it should have permanent marking on all sides saying “DO NOT USE” in 12-inch red letters.

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AGS Shielding Block 24' x 2' Roof Beam

Effective Date: **April 2004**

Point of Contact: Lifting Safety Committee Chair

AGS Shielding Block 24' x 2' Roof Beam is provided as a PDF file.

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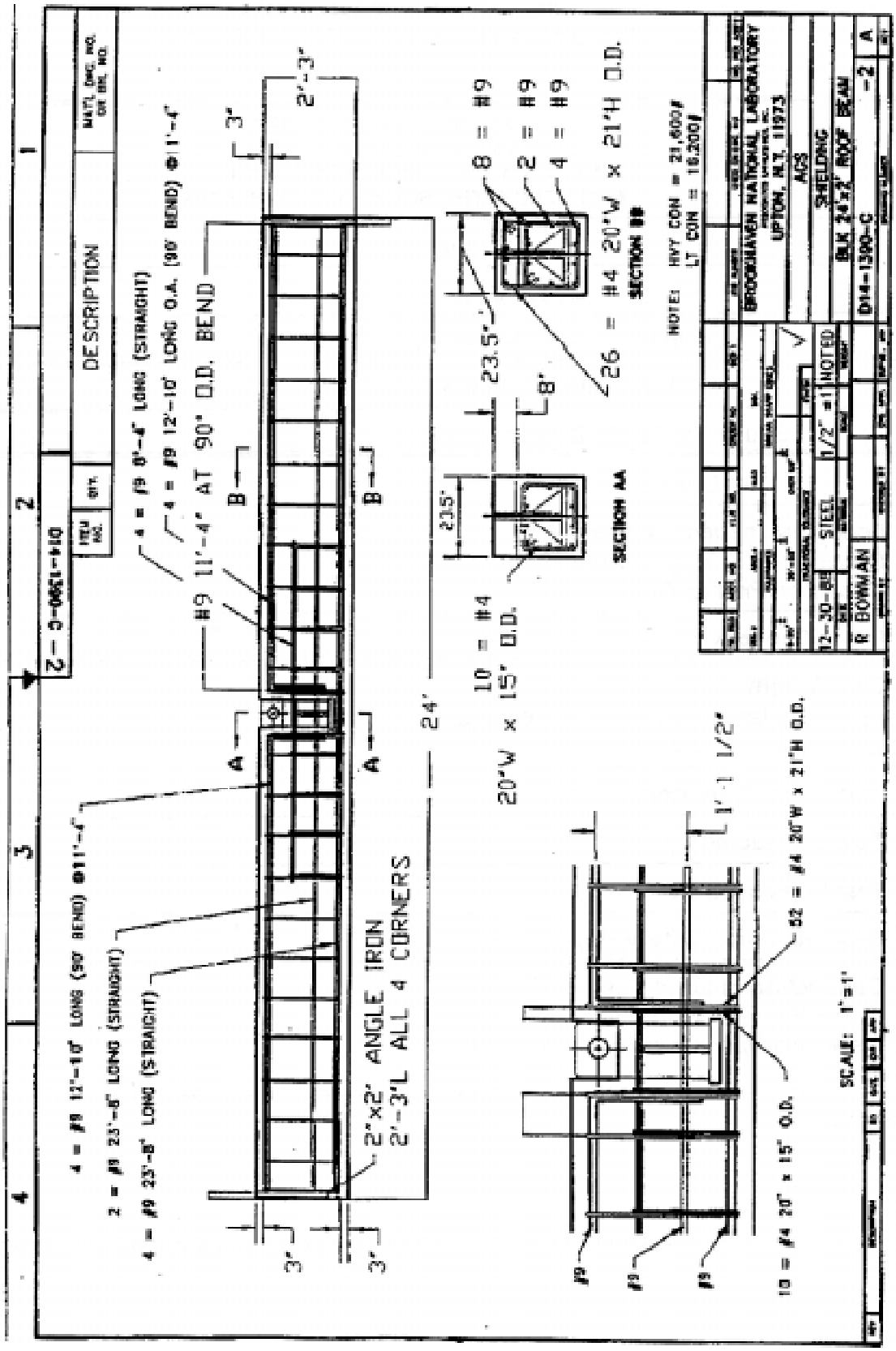
Appendix M: AGS Shielding Block 24' x 2' Roof Beam



Checklist for Lift Planning

Planners and reviewers use this checklist to confirm completeness of the lift plan. These items are included as a guide but should not be interpreted as being all-inclusive in the analysis and preparation of a Critical or Pre-Engineered Lift. Sound engineering and planning is still the responsibility of the engineer or project manager associated with the lift.

Never vary from the approved Lift Plan without a full review and approval by the Lifting Safety Committee.

Subsurface and Foundation Issues

- What are the maximum loads imposed by the cranes on the soil/facility floor? Is the soil-bearing capacity adequate to safely support crane loads? Has a soil investigation program been performed? What is the assumed load distribution through the timber mats?
- Has a soil investigation of the area under the path of the tailing crane (borings, etc.) been performed?
- What pressures will be imposed on any underground structures (sewer lines, etc.)?

Transportation and Interim Storage Issues

- Has the responsible manager and the Safeguards & Security Division been notified of movement of the load to the lifting site (notification at the discretion of the responsible planner)? Are any permits required?
- Has the load transport route to the lift site been checked for overhead obstructions? Are there any bridges, culverts, pipe ways to cross? Are they structurally capable of safely supporting the transport loads?
- Where will the crane be assembled? What route will the crane take from the assembly site to the lift site?
- How will the load transport get to the lift site? How will the transport be removed once the load is lifted?

Crane Issues

- What is the minimum actual clearance between the load and the boom during the lift?
- Has the radius been double-checked by measuring in the field?
- Will the crane load change as the lift progresses?
- How many parts of line are needed? How was this determined?
- Will spreaders and other rigging hardware remain safely clear of the boom, the load, and other objects at all times during the lifting operation?
- If a tailing crane has to "walk," is the path level properly compacted?
- What efforts have been made to identify obstructions in the lift path and swing path? How accurate are these efforts?
- Can the outriggers be deployed as per manufacturer's load chart requirements?
- Can rigging personnel safely control and manipulate the load throughout the lifting path?
  Are the crane's operational safety alarms functioning properly? How, when, and were they tested?
- Have plans been developed to monitor the crane's stability during lift?
- Has a procedure been developed to monitor plumbness of load lines (in two directions)?
- Has a drawing showing the elevation of the crane during the lift as well as all clearances been developed (boom to load, and load to other obstructions)?

- Have all repairs or modifications to the crane been made in accordance with manufacturer's written instructions, and are they so certified?
- How will the crane's electronic safety alarms and interlocks be checked for operation and accuracy?
- Has the agreed nondestructive examination (NDE) of crane components been done and documented?
- Is the lift line new or has a piece of the lift line been pull-tested?
- Has a procedure to monitor tail swing of the crane during lifting operations been developed?
- Is the correct crane load chart for current lift conditions in the cab?
- Is there adequate headroom to ensure that the manufacturer's minimum allowable two-block distance is maintained for the configuration of the reeve used?

Load Weight & CG Issues

- How was the weight determined when developing the lift plan? Has any margin been added to calculated weights?
- Has an accurate load weight determination been made before the lift to confirm calculated weight? How was this performed?
- Has the weight of any jibs, auxiliary boom heads, etc. been considered in the calculations?
- Has all the rigging hardware been included in the weight calculations?
- Who has determined the center of gravity? How was it determined? Is it marked on the load? Is it shown on the lift plan drawings?
- Is there anything inside the load that could shift during the lift?
- Has snow or ice accumulated on the load since the weight was determined?
- Is the surface area large enough to create unusual control problems in the wind?
- Has all hydrotest water been drained from the load (vessel) before lifting?
- If lifting a dressed device, has the insulation absorbed any water?
- If lift is of an existing item (being removed or demolished), have all anchor bolts and fasteners been removed?

Rigging Issues

- Has all rigging hardware been selected to work within the manufacturer's Safe Working Load?
- Have sling angles flatter than 45 degrees been avoided, and have the slings or chains and shackles been chosen to allow for increased loads due to sling angles?
- Have softeners been used to protect the rigging where sharp corners could cause damage?
- Does the rigging provide positive control of the load to prevent slipping or shifting?
- Are shackles and hooks always used in such a manner as to avoid side bending in the hardware?
- Have qualified personnel designed and tested special rigging hardware in accordance with regulations?
- Is there a plan for removing lifting tackle from the load after it is erected?
- How will the shackle pins be removed after the lift is complete? Will a pin extractor be required, and if so, manual or hydraulic?
- What level of inspection have the shackles, hooks, slings, etc. been subjected to? Will a pull-test be conducted on the slings?
- Are the shackle pins and lifting eyes compatibly sized?
- How will side loading/bending of shackles and hooks be avoided?
- Have all rigging components such as shackles, hooks, and slings, been inspected for signs of damage or deterioration before use?

- Is the rigging arranged to have the crane hook directly over the load's center of gravity with the load hanging level?

Roles & Responsibility Issues

- Who is the Person-In-Charge (PIC) of the lift? What are their qualifications? Who will give the signals to the operator?
- Has the Department/Division Safety Committee been involved in the lift planning process or lift plan review?
- Has the Laboratory Lifting Safety Committee been involved in the lift planning process or lift plan review?
- Has the lift plan been reviewed with the crane operator, riggers, and others involved in the lifting operation? Has the plan been reviewed with supervisors and workers in adjacent areas?
- Has a chain of command to operate during the lift been established, and how are the involved people identified?
- Has a final pre-lift safety meeting been scheduled?
- Are there any language difficulties? Does everyone speak (fluently) the same language?

Operational Envelope Issues

- What are the limits on wind speed for making the lift? How and where will wind speed be measured?
- Is cold weather likely to affect the lift? Is it necessary to derate the crane or any part of the rigging equipment due to low temperatures?
- Is adequate lighting equipment available for use, if the lifting operation should extend beyond normal daylight hours?
- Are required personnel (operations, safety, other) available if the lift operation should extend beyond normal hours?
- Are there overhead power lines in the operating area? If so, have minimum clearance requirements been established and has a dedicated signal person been assigned to monitor boom, load and/or load line position relative to the power line?
- If operating near overhead power lines, are nonconductive taglines being used?

Emergency Procedural Issues

- Have emergency procedures been determined and communicated to all personnel involved in the lifting operation?
- If required, has confirmation of notification to adjacent Departments/Divisions and local Security and Fire Rescue been received?
- Has agreement been established on required actions if operational alarms occur during the lift?
- Has a review of operational activities planned/occurring during time of lift been performed?
- Has a review/agreement of safety / barricade/evacuation plans been done?
- Has a review/agreement of contingency plans in event of a site alarm or operational upset during lift been made?
- Have emergency plans been developed by, communicated to, and understood by operating personnel? Are the operating personnel clear regarding isolation of lines containing toxic or flammable materials? How are the valves identified? Does the lift plan reflect the philosophy that safety is the top priority?

Load Design Follow-up Issues

- Is the load fragile enough to require lifting from a "strong back" frame or from multiple attachment points to prevent load damage?
- Has the "strong back" frame been designed by a competent engineer, inspected, and load-tested?
- Has any required nondestructive testing been done to assess the quality of welds attaching lifting lugs, pad eyes, trunnions, etc.?
- Has anyone checked that the shackle pins will fit the holes provided in the lifting lugs?
- Are the dimensions of the lifting lugs/pad eyes consistent with the size of shackle proposed? Will the shackle be able to "turn" as the load goes from horizontal to vertical?
- Have the appropriate impact factors been used in designing the lifting lugs, shackles, etc.?
- Is there enough clearance between the load and the lifting lug/pad eye to get the nut on the shackle pin?
- What are the inspection requirements for the lifting attachments (lugs/pad eyes)? Who will do it?
- Has the load (tower) design been analyzed for localized buckling and bending shear stress during the lift operation in order to verify that allowables will not be ***exceeded during the lift?***
- If trays or internals are to be installed before lifting, has the possibility of load shift been considered?
- Are all engineered lifting components (spreader bars, lift lugs, etc.) designed to ASME B30.20, Below-the-Hook Lifting Devices? (Show calculations).
- Are the lifting lugs designed about the weak axis using a force equal to a minimum of 5% of the force of the sling? (Show calculations).
- Who has designed the lifting lugs/trunnions? Has design been checked by Safety and Health Services?

Peripheral Issues

- Are radios required? Who will provide them? Are they safe for use in operating facilities?
- Has a review/agreement of communications plan during lift (i.e., dedicated radio channels) been made?
- Has the anchor bolt pattern, if required, been checked to confirm the load can be landed properly?
- Will critical spare parts be available for the crane(s) during the lift? Are mechanics available?
- Has a drawing showing the barricade plan to be used during the lift been developed?
- Has the operator(s) undergone a drug test?
- Is a back-up operator available in case of emergency?
- Are crane maintenance personnel available during the lift?

Subject Area: ***Lifting Safety***

Classifying Lifts

Effective Date: **April 2004**
Point of Contact: Lifting Safety Committee Chair

Classifying Lifts is provided as a Word file.

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Classifying Lifts

	CLASSIFICATION	
CONDITIONS	**ORDINARY** **(All conditions must be met)** **A-2 thru A-4**	**CRITICAL** **PRE-ENGINEERED** **(Any one condition)** **A-1**
INJURY TO PERSONNEL	PROBABILITY LOW FOR A LOST-TIME ACCIDENT	LIFT COULD POTENTIALLY RESULT IN A LOST-TIME ACCIDENT
SCHEDULE IMPACT	NEGLIGIBLE, MINOR, OR MAJOR[1] ?? LESS THAN 3 WEEKS ?? LESS THAN 30% OF PROGRAM SCHEDULE	CRITICAL[1] ?? 3 WEEKS OR MORE ?? 30% OR GREATER OF PROGRAM SCHEDULE
ENVIRONMENTAL IMPACT	WORK DOES NOT MEET SIGNIFICANCE CRITERIA	WORK HAS AN ENVIRONMENTAL ASPECT THAT MEETS SIGNIFICANCE CRITERIA
COST IMPACT	NEGLIGIBLE, MINOR, OR MAJOR[1] ?? LESS THAN $250K ?? LESS THAN 50% OF ITEM/ MATERIAL OR PROGRAM COST	CRITICAL[1] ?? GREATER THAN $250K ?? 50% OR GREATER OF ITEM/MATERIAL OR PROGRAM COST
RADIATION EXPOSURE TO WORKER	NO UNPLANNED RELEASE TO THE ENVIRONMENT	UNPLANNED RELEASE TO THE ENVIRONMENT
RIGGING AND HEAVY LIFTING	ROUTINE BUCKET TRUCK, FORKLIFT, OR CRANE WORK WITH TRAINED PERSONNEL	?? LIFT IS 95% OR MORE (MOBILE CRANE), OR 95% OR MORE (FIXED CRANE) OF THE RATED CAPACITY OR GROSS WEIGHT IS GREATER THAN 50 TONS ?? WORK MEETING THE DEFINITION OF CRITICAL LIFT
ADDITIONAL FACTORS	POTENTIAL CONSEQUENCES CLASSIFIED AS NEGLIGIBLE, MINOR OR MAJOR[1]	POTENTIAL CONSEQUENCES CLASSIFIED AS CRITICAL[1]

[1] As defined by Screening Guidelines for Work Planning & Control and Application of the Quality Graded Approach in the Work Planning and Control for Experiments and Operations Subject Area.

NOTE: The lift classification may be determined using the above chart. Any one condition will place the lift within the classification. Note that some lifts are classified as critical lifts because of items they are lifted over or attached to.

A CRITICAL LIFT REQUIRES MITIGATIVE ACTIONS THAT INCLUDE A WRITTEN LIFT PROCEDURE APPROVED BY THE LIFT MANAGER TO REDUCE THE RISKS.

Subject Area: ***Lifting Safety***

Criteria for Resubmittal of Pre-engineered Lifts

Effective Date: **April 2004**

Point of Contact: Lifting Safety Committee Chair

Criteria for Resubmittal of Pre-engineered Lifts is provided as a Word file.

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Criteria for Resubmittal of Pre-engineered Lifts

A Pre-engineered Lift is defined as a lift or group of lifts that are repetitive, and which meet the definition of a critical lift. If it can be demonstrated through the use of tooling, fixtures, sketches, and analyses, with written procedures that the possibility of dropping, upset, or collision can be reduced to an acceptable level, as determined by the Lifting Safety Committee, the lift may be designated as a pre-engineered lift. The Pre-engineered Lift may then be performed multiple times without re-approval by the Lifting Safety Committee for as long as the elements on the completed and approved Critical Lift Evaluation Form (CLEF) are unchanged, and the Pre-engineered Lift Procedure is not changed. Once approved by the LSC, the procedures for a Pre-engineered Lift cannot be changed without approval of the LSC.

It is acknowledged that personnel changes will occur while the Pre-engineered Lift CLEF and Pre-engineered Lift Procedure remain constant. For this reason, it is incumbent upon Department/Division personnel, especially the professional engineer/qualified person and responsible manager or designee that signed the CLEF, to ensure the personnel performing a Pre-engineered Lift are fully qualified and competent to perform that task. A completed, signed reading acknowledgement form shall be submitted with the Department/Division-approved Pre-engineered Lift Procedure when the CLEF is submitted for approval by the Lifting Safety Committee. Thereafter, as personnel are added and removed from the Department/Division list of personnel authorized to perform the Pre-engineered Lift, the updated reading acknowledgement form shall be submitted to the Lifting Safety Committee for their records.

The changes to the following elements of the CLEF and/or the Pre-engineered Lift Procedure shall be cause for resubmittal to the Lifting Safety Committee:

OPERATING EQUIPMENT: any change to the operating equipment shall be resubmitted to the Lifting Safety Committee for approval.

DESCRIPTION OF ITEMS TO BE LIFTED: any change to the items to be lifted, the order in which they are lifted, or the arrangement of the items to be lifted, or modifications to the items to be lifted, shall be resubmitted to the Lifting Safety Committee for approval.

HOW WEIGHT OF OBJECT OBTAINED: any change to the weight of the item to be lifted, or the manner in which the weight was originally obtained in the approved CLEF, shall be resubmitted to the Lifting Safety Committee for approval.

CENTER OF GRAVITY (CG): any change to the item that may affect the center of gravity or the manner in which it was calculated, shall be resubmitted to the Lifting Safety Committee for approval. The item to be lifted may change during use after initial installation, as from accumulation of materials during use. These items require re-review especially if the item cannot be returned to the originally approved condition.

DESCRIPTION & WEIGHT OF ALL RIGGING EQUIPMENT & CRANE ATTACHMENTS: any change to the rigging equipment, crane attachments, or the weights of the originally approved equipment, shall be resubmitted to the Lifting Safety Committee for approval.

WEIGHT OF OBJECT, RIGGING EQUIPMENT, & CRANE ATTACHMENTS; any change to the total weight to be lifted shall be resubmitted to the Lifting Safety Committee for approval.

EQUIPMENT AND LIFT RELATIONSHIP: any change to the equipment and the lift relationship, such as, Maximum Operating Radius, Planned Operating Radius, Allowable load at maximum lift radius anticipated (from Load Chart), Ratio of Lift to Allowable Load, Clearance between Boom & Lift, Clearance to Surrounding structures, facilities and utilities, or Clear Path for Load Movement, shall be resubmitted to the Lifting Safety Committee for approval.

STABILITY OF GROUND AREA: any change to the ground stability of the area where the lift is to be conducted shall be resubmitted to the Lifting Safety Committee for approval. This includes any excavation, construction, or demolition in the area since the CLEF was last approved.

LIFTING OPERATION: any modification to the lifting operation, such as the Set-up Area, Lifting Area, Load Placement Area, and Sling Attachment Points, the sling angle reduction factor, or the drawings that are an attachment to the approved CLEF, shall be resubmitted to the Lifting Safety Committee for approval. Any change to the Department/Division-approved Pre-engineered Lift Procedure, except for authorized personnel, as discussed above, shall be resubmitted to the Lifting Safety Committee for approval.

Subject Area: ***Lifting Safety***

Critical Lift Plan and Pre-engineered Lift Procedure

Effective Date: **April 2004**

Point of Contact: Lifting Safety Committee Chair

The Critical Lift Plan and Pre-engineered Lift Procedure is provided as a Word file.

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Critical Lift Plan and Pre-engineered Lift Procedure

A Critical Lift Plan and Pre-engineered Lift Procedure consists of as many drawings, specifications, and procedures as necessary to accurately assess all important load factors and site factors relating to a Critical Lift. These items are included as a guide but should not be interpreted as being all-inclusive in the analysis and preparation of a Critical or Pre-engineered Lift. Sound engineering and planning is still the responsibility of the cognizant engineer and/or project manager associated with the lift. The exhibit Checklist for Lift Planning summarizes those factors. Most lifts, however, even some Critical Lifts, do not involve all of the factors listed there.

The lift plan for a Pre-engineered Lift must be a Department/Division procedure, subject to the review, approval, and records management policies of the Department/Division. This includes the signed reading acknowledgement for individuals performing the actions of the procedure, specifically the Person-in-Charge (PIC) of the lift and the crane operator. The elements required for a Critical Lift Plan also are required for a Pre-engineered Lift Procedure (lift plan).

The following is the minimum level of information required for completing an adequate lift plan:

Elevation View Drawing of the crane, load, and any nearby structures, which could cause interference. This drawing must be made to scale and should note

?? Crane manufacturer(s), model(s), and counterweight(s) if variable.
?? Boom length(s) and lifting radius(i).
?? Maximum load elevation during lifting procedure.
?? Any jibs or special lifting devices required.
?? Minimum number of parts of crane hoist line required for lifting the load.
?? All required slings, shackles, and other rigging components identified by capacity, size, length, and location.
?? Calculated center of gravity of load.

Plan View Drawing of the crane, load, and nearby structures, which could cause interference. This drawing must be made to scale and should note

?? Route that transport will take to position the load for lifting.
?? Initial lifting position of the load including radius. Lifting radius must be accurately determined.
?? Final placement position of the load including radius. Lifting radius must be accurately determined.
?? Location of the crane(s) including tail swing limits.
?? Route that crane(s) will take if walking with the load, as well as associated matting requirements.
?? Any utilities located within the work zone. Underground facilities - piping, ducts, etc. - must be accurately located.
?? Space may be needed to assemble crane.
?? Planning must include load transportation considerations, e.g., how to get the load close enough to the crane. This may be a function of the type of crane being used, for example, since some cranes perform better in certain sectors (quadrants) of operation than others.

Lift Analysis, including

?? Tabulation of the gross load weight, including the weight of all blocks and rigging tackle.
?? Rigging attachment points and special rigging requirements.
?? Gross rated capacity of the crane in the configuration specified.
?? Calculation of the percentage of the crane's rated capacity at which the lift will be made.
?? Crane-imposed soil loads must be determined. Soil analysis may be needed to verify crane-imposed loads can be safely supported.
?? Allowable weather conditions for the lift and the effect of wind loading.
?? Sequence of work, including lift-off, steady state conditions, and set-down of load (including positions where there is a shift in the location of the center of gravity, for the pick points).

All potential complicating issues for any lift must be addressed in the lift plan. However, for a relatively simple operation, the above items can provide sufficient information and even be organized onto one drawing.

Subject Area: ***Lifting Safety***

Lift Assessment

Effective Date: **April 2004**
Point of Contact: Lifting Safety Committee Chair

Lift Assessment is provided as a Word file.

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Lift Assessment

Crane work at sites involves lifting and placing many types of materials in both “safe” and hazardous locations. Although some lifts are extremely heavy, or made over operating equipment, typically the loads are small and do not require a significant amount of planning to ensure the operation is performed safely. Although large or complicated lifts are easily recognized as being of a critical nature requiring additional planning, the hazards associated with smaller lifts may be less obvious. The lift plan process should be followed regardless of the specifics of a lift. The degree to which it is applied depends on the results of the Lift Assessment Process. The Lift Assessment Process is necessary to determine if the lift is Ordinary, Pre-engineered, or Critical.

Determination of Critical Lift

Each lift is classified into one of three categories:

- ?? Ordinary;
- ?? Pre-engineered; or
- ?? Critical.

A lift is designated as a **Critical Lift** if collision, upset, or dropping could result in the following:

1. **Any** unplanned release of dispersible radioactive material, or hazardous material meeting significance criteria.
2. **Any** major potential risk of bodily injury.
3. **Unacceptable programmatic delay,** nominally greater than 3 weeks, or 30% or greater of program schedule, to the operation of an experiment, facility, or other component or system that directly affects the fundamental Laboratory infrastructure or mission (i.e., accelerator systems, substations, chilled water)
4. **Damage** to equipment and facilities, which may exceed $250,000.

A lift also is designated as a **Critical Lift** if

1. The load, including weight of below the hook lifting gear, exceeds 50 tons.
2. The load being lifted has a single surface area greater than 400 sq. ft.
3. Below the hook weight exceeds 95% of the capacity of the rated capacity for fixed (building) crane, or 95% of the rated capacity for mobile crane, performing the lift.
4. Any lift where the component being lifted requires installation tolerances beyond the capability and sensitivity of the crane controls.
5. Any lift assembly that incorporates a pre-engineered lifting configuration or nonordinary lifting gear. Included would be lifting arrangements that require engineering analysis in order to determine possible shifts to the component's center of gravity (i.e., rollers, counter weight spreaders) or where the center of gravity of the lift is situated above the lift points.
6. Any component where the actual weight cannot be readily determined.

7. Lifts that are made where the load is set down onto, or crane outriggers are placed over buried utilities, adjacent to overhead transmission lines, or where outrigger pads exceed 70% of the allowable bearing capacity of the supporting soil.
8. Any lift meeting any of the criteria for a critical lift on the Critical Lift Evaluation Form.
9. Any situation deemed critical by the person in charge, rigging supervisor, project engineer, or manager.

Determination of Pre-engineered Lift

A lift is designated as Pre-engineered if

?? The lift, as determined and approved by the BNL Lifting Safety Committee (LSC), is a repetitive- or production-type lifting operation using specialized lifting fixtures and tooling, supported by analysis, sketches, and a Department/Division-approved and -controlled lift procedure. This includes lifting operations that are expected to recur periodically during a foreseeable facility operation, e.g., annual installation and removal of a shield block wall. A Critical Lift may be reclassified as a Pre-engineered Lift based on a formal request and review of it. This reclassification is at the discretion of the LSC.

Determination of Ordinary Lift

An ordinary lift is a proposed lift that is not deemed to be a Critical or Pre-engineered Lift. Contractors working at BNL must submit a Rigging Plan Worksheet to the BNL Hoisting and Rigging Inspector. A minimum of four (4) working days is required for review and approval of the Rigging Plan. All lifting and rigging equipment must be approved by the BNL Hoisting and Rigging Inspector prior to use at BNL.

See the exhibit Classifying Lifts for information on determining these lifts.

Weather Factors

Weather conditions can adversely affect lifting activities. They need to be thoroughly considered both during the planning and execution of a lift. Special efforts may be required to ensure adequate warning is provided to avoid a sudden storm disrupting a lift in progress.

WIND

A great deal of judgment is required when assessing when it is too windy to continue lifting operations. Most crane manufacturers have some recommendations concerning the maximum permissible wind speed, or how to derate the crane under windy conditions, since their load charts assume no wind at all. If there is no information on the load chart or in the operating instructions, the crane manufacturer should be consulted, and the maximum allowable wind speed and derating information posted conspicuously in the cab or right on the load chart.

In the absence of manufacturers' specific advice, seriously consider postponing the lift if the wind speed is in the range of 15-20 mph (7-9 m/s). Above 25 mph (11 m/s), the lift should be canceled.

Some of the issues to consider when faced with windy weather conditions are

- ***The geometry and shape of the load.***
  Is there a large area exposed to wind loads? How difficult will the load be to control if a gust of wind catches it?
- ***How high is the load to be lifted?***
  Wind speed generally increases with height.
- ***Backward stability.***
  Backward stability can be a problem when the wind is from the front and the boom is high.
- ***Wind from behind a crane.***
  Wind coming from the rear of the crane can cause the load to be blown away from the crane, increasing the radius and decreasing the crane capacity.
- ***Wind from the side of a crane.***
  Wind corning from the side can put a load on the side of the boom and blow the load off vertical; which, in turn, can place an additional side load on the boom. In the United States, most booms are designed for a 20 mph (9 m/s) wind velocity on the side of the boom, plus a side load equal to 2% of the rated load.
- ***Operating a crane between structures.***
  Operating a crane between buildings or process equipment under windy conditions can be hazardous due to the "wind tunnel" effect. As air blows around obstructions, there can be local areas of increased velocity that may exceed the safe lifting limit even though the general wind speed is not a problem. A wind speed indicator (anemometer) fixed to the boom point is a good idea under these conditions.

COLD WEATHER

Extremely cold weather can negatively affect crane and lifting operations. When temperatures drop below 10°F, appropriate consideration should be made with respect to shock loading, crane hydraulics, and possible derating of the crane (consultation with the Plant Engineering Division's Crane/Hoisting & Rigging Inspector and/or Plant Engineering Division's Rigging Supervisors is required). The following is a listing of cold weather lifting restrictions:

TEMPERATURES	PRECAUTIONS
-5°F (-15°C) to -22°F (-30°C)	Avoid impact or shock loading of crane and rigging. Operations involving hydraulic cranes should be conducted with due regard to potential failure of hydraulic components. For critical lifts, cranes should be derated by 25%. The effect of wind chill on operators, riggers, and signal persons should be considered. Lifting should be halted if these personnel are unable to operate efficiently and safely.
-22°F (-30°C) to -40°F (-40°C)	Cranes should be derated by 40% for all lifts, and halting of all lifting activities should be considered.
below -40°F (-40°C)	All lifting prohibited except for extreme emergencies.

OTHER CLIMATIC CONDITIONS

Other weather conditions can create hazardous conditions for lifting. Rain, fog, or snow could obscure the load, the signal person and/or the boom tip, making crane-lifting operations very dangerous. In addition, extreme heat, heavy rain, snowstorms, or even heavy snow flurries can be distracting to those involved in the lifting operation. It is important for those people to remain focused on the lift until the load is safety landed, and the load is off the hook.

Crane booms can act as a lightning rod and great care should be taken to be aware of changing weather conditions if a thunderstorm should suddenly develop. At the first sign of a thunderstorm (or at least of lightning), lifting activities should be brought to an orderly close. The boom should be lowered and/or retracted as much as possible, and personnel should leave the area. If the crane is struck by lightning, it should be thoroughly inspected before being put back into service. The path of the electricity is difficult to predict and there may be hidden damage (pitting) where arcs have occurred (often in bearings).

Heavy rain, especially if wind-driven, also can affect crane operations. Water can get into friction elements (brakes, clutches, etc.) and render them inoperable. When these conditions exist on older friction-type cranes, operators may have to "dry out" the brakes by lightly engaging the device enough to produce enough heat to dry out the components.

Subject Area: ***Lifting Safety***

Critical Lift Evaluation Form (CLEF)

Effective Date: **April 2004**

Point of Contact: Lifting Safety Committee Chair

The Critical Lift Evaluation Form is provided as a Word file.

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CRITICAL LIFT EVALUATION FORM (CLEF)

✍✍ **Critical Lift**
✍✍ **Pre-engineered Lift**

PERSON REQUESTING THE LIFT

Print Name _____Dept/Div. _____Date _____

PERSON IN CHARGE (PIC)

Print Name _____

PIC must be present during the entire CRITICAL LIFT and be QUALIFIED to resolve any question or problems that might arise during the lifting operation.

DETERMINING FACTOR FOR CRITICAL LIFT

____ Load is greater than 95% of mobile crane rated capacity, or greater than 95% of rated fixed crane capacity, or greater than 50 tons.

____ Two or more cranes/booms are required or special hoisting/rigging equipment will be used.

____ Potential for release of radioactive/hazardous materials due to collision, or upset of load.

____ Damage that would result in more than 3 weeks or 30% delay to schedule, or monetary value damages of $250,000 or greater.

OPERATING EQUIPMENT (mobile crane)

Type of Crane _____ Manufacturer _____

Model No. _____ Serial No. _____

Manufacturer Restriction for WIND SPEED _____ (no lifts at wind speeds of 25 mph or greater)

Crane Equipped with Anemometer _____ (if not, use BNL Weather Station)

Copies of Latest Annual Inspection _____ Latest Calibration Date of Instruments _____

Operator Licensed for Equipment _____ Expiration Date _____

OPERATING EQUIPMENT (overhead cranes)

Type of Crane _____ Manufacturer _____

Capacity _____ Latest Calibration Date of Instruments _____

Date of Latest Annual Inspection _____ Operator's SAC Expiration Date_____

DESCRIPTION OF ITEMS TO BE LIFTED

_____

_____

_____

HOW WEIGHT OF OBJECT OBTAINED

A. Certified Weight Scale _____ Ticket # _____

B. Calculated Independently by More than One Source

1. Source _____ Weight _____
2. Source _____ Weight _____

C. If lift is an existing item (being removed or demolished), the weight must be recalculated, taking into account all modifications, including internal, as well as an Allowance for Scale, Sediment, Sludge, and Insulation. Calculation Work Sheets SHALL be included in the LIFT PLAN and have a PE stamp or be signed off by a QUALIFIED PERSON. **(When weights are calculated, a 10% tolerance margin shall be added. This value may be increased at the discretion of the Lifting Safety Committee).**

D. Shipping Manifests Weight _____ Manufacturer Data Weight _____

CENTER OF GRAVITY (CG)

CG will be marked onto load, and a drawing included showing how it was determined.

DESCRIPTION & WEIGHT OF ALL RIGGING EQUIPMENT & CRANE ATTACHMENTS

Type of slings _____ Rated Capacity _____ Weight _____

_____ _____ _____

_____ _____ _____

Shackles _____ _____ _____

_____ _____ _____

Lifting Rings/ _____ _____ _____

Eyebolts _____ _____ _____

Riggings Hooks _____ _____ _____

Load Block/Jib _____ _____ _____

Spreader Bars/Below the Hook Lifting Devices Rated Capacity _____ Weight _____

(Must comply with ASME B30.20 Standard for _____ _____

Design, Testing, and Appropriate Markings) _____ _____

WEIGHT OF OBJECT, RIGGING EQUIPMENT, & CRANE ATTACHMENTS

Source _____ Total Weight _____

EQUIPMENT AND LIFT RELATIONSHIP

A. Maximum Operating Radius: _____

B. Planned Operating Radius: _____

C. Allowable load at maximum lift radius anticipated (from Load Chart): _____

D. Ratio of Lift to Allowable Load: _____

E. Clearance between Boom & Lift: _____

F. Clearance to Surrounding

Facilities/Utilities: _____

G. Clear Path for Load Movement: _____

STABILITY OF GROUND AREA

A. Soil Bearing Capacity: _____ Source: _____

B. Mats Required: _____ Size & Number: _____

C. Underground Utilities Location: _____

D. Ratio of Soil Bearing Capacity to Actual: _____

LIFTING OPERATION

A detailed drawing, to scale, MUST be included showing the Set-up Area, Lifting Area, Load Placement Area, and Sling Attachment Points w/sling angle reduction factor. A documented Critical Lift Plan or Pre-engineered Lift Procedure, as applicable, shall be included.

INSPECTION OF CONTRACTORS EQUIPMENT

All contractors' Lifting and Rigging Equipment must be inspected before being brought onto the BNL Site by BNL Hoisting & Rigging Inspector: Contact: John Hynan: (631) 344-5456

LIFT APPROVAL SIGNATURES

Professional Engineer/ Qualified Person: _____

Person in Charge (PIC) (Critical Lift): _____

Operator of Equipment (Critical Lift): _____

Responsible Manager or Designee: _____

Lifting Safety Committee Recommendation: Approve: _____ Disapprove: _____

LSC Committee Chair: _____

FINAL APPROVAL SIGNATURE:

Deputy Director for Operations _____

PRE-LIFT MEETING

Date: _____ Time: _____ Location: _____

LIST OF ALL ATTACHMENTS

Subject Area: ***Lifting Safety***

Electric (DC) Motor Forklift

Effective Date: **April 2004**

Point of Contact: Lifting Safety Committee Chair

Electric (DC) Motor Forklift is provided as a Word file.

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Electric (DC) Motor Forklift
Pre-Start (Visual) Check Points

#	Item	N/A	OK	Fix
01	Forklift equipment # (MMC tag No.)			
02	Hour meter reading			
03	Specification nameplate			
04	Battery charge			
05	Battery electrolyte level and cap vents			
06	Battery connections			
07	Hydraulic fluid level			
08	Hydraulic hoses			
09	Hydraulic lift and tilt cylinders			
10	Fluid leaks			
11	Wheels and tires			
12	Chain and hose guards			
13	Mast assembly and cap bolts			
14	Lift carriage and teeth			
15	Safety stops and latches			
16	Forks and latches			
17	Back rest			
18	Overhead guard			
19	Seat belt			
20				
21				
22				
23				
24				
25				

Comments:

Operator Name: Date:

Pre-operational checkpoints on other side

Electric (DC) Motor Forklift
Pre-Operational Check Points

#	Item	N/A	OK	Fix
01	Neutral safety switch (operating)			
02	Horn (audible)			
03	Backup alarm (audible)			
04	Headlights (functional and visible)			
05	Turn signal (functional and visible)			
06	Wiper(s) (functional and effective)			
07	Warning light (functional and visible)			
08	Foot brake (pedal holds/smooth stop)			
09	Parking brake (holds against acceleration)			
10	Directional controls (smooth operation)			
11	Motor noise (normal)			
12	Emergency battery disconnect			
13	Dash gauges (operating)			
14	Steering/turning (smooth operation)			
15	Lift mechanism (smooth operation)			
16	Tilt mechanism (smooth operation)			
17	Side shifter (smooth operation)			
18	Fluid leaks (under forklift or near hoses)			
19	Wheel/tire revolution (smooth & no bumps)			
20	Dead-man seat brake			
21				
22				
23				
24				
25				

Comments:

Pre-start checkpoints on other side

Subject Area: ***Lifting Safety***

Inspection Reports

Effective Date: **April 2004**

Point of Contact: Lifting Safety Committee Chair

Choose and complete the applicable inspection report.

Weekly/Monthly Mobile Crane and Boom Truck Inspection Report
Overhead Crane/Hoist Inspection Checklist
Frequent Inspection Guide for Forklifts (Internal Combustion)
Frequent Inspection Guide for Forklifts (Electric)
Frequent Inspection Guide for Aerial Lifts
Hoist Inspection Report
Overhead Building Crane Inspection Report
Periodic Inspection Report for Forklifts
Mobile Crane & Boom Truck Inspection Report
Periodic Inspection Report for Aerial Lifts
BNL Crane/Hoist Hooks Inspection

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Appendix A: Weekly/Monthly Mobile Crane and Boom Truck Inspection Report

(By Plant Engineering Division Hoisting and Rigging Inspector)

Weekly/Monthly Mobile Crane and Boom Truck Inspection Report		
Dept/Div.:	Equipment #:	Date:
Inspection By:	Life No.:	

Service Required ☒	Inspection Point
☐	GENERAL APPEARANCE: check paint, tires, body sheet metal, glass and housekeeping
☐	CRANE CAB: check for load rating chart, proper place-carding of controls, working gauges, and operating manual.
☐	CARRIER AND CRANE ENGINE: check all fluid levels in engine, transmission, radiator, exhaust, belts, batteries, electrical system, and air compressor.
☐	CARRIER AND CRANE DRIVE TRAIN: check drive shaft and U-joints, front and rear axles for leaks, springs, brake system, steering system, tire pressure, swing brake, and positive lock on swing
☐	OUTRIGGERS: check for hydraulic leaks, floats, pins, keepers, holding valves, and upper and lower operating controls
☐	HYDRAULIC BOOM: check for leaks, boom travel, hinge pins, wear/roller pads, hydraulic hose reel, and boom for leaks.
☐	LATTICE BOOM: check boom lacing, structure, heel pins, and boom stops.
☐	LOAD BLOCK (see Note below): check sheaves, hooks, hook safety latch, hoist rope, swivels, rope reeving, and rope anchoring.
☐	MAIN AND AUX HOIST (see Note below) check wire rope condition, rope spooling, brakes, ratchet and pawl drum flanges, hydraulic system for leaks, and control levers.
☐	BOOM HOIST (see Note below) check wire rope ends, rope anchoring, brakes, clutches, and controls
☐	COUNTER WEIGHT check mounting bolts
☐	SAFETY ITEMS check back-up alarms, level indicator, load indicator, load charts, anti-two block system, hand signal chart, angle and radius indicator, horn, all lights, an fire extinguisher.
☐	NO DEFECTS FOUND

Comments: .....

.....

.....

(continue comments on back if necessary)

NOTE: This inspection shall be performed as per ANSI-B30 Series for 30-day wire rope and hook inspections.

Appendix B: Overhead Crane/Hoist Inspection Checklist

Overhead Crane/Hoist Inspection Checklist
(Daily or Before Each Use)

Dept/Div:	Crane #:	Bldg. #:	Date:
Operator Name:		Life No.:	

- ☐ **Locate Crane Main Disconnect Switch**
- ☐ **Check Pendant Controls of Controllers or Selector:** *Up, Down, East, West, North, and South*
- ☐ **Check Wire Rope of Chain for Damage:** *On main hoist and aux for worn, cut, kinked, crushed, spooling, or birdcaged cable*
- ☐ **Check Hooks:** *Bent, spread, cracked, and safety latch*
- ☐ **Check Upper Limit Switch:** *Hook block stop*
- ☐ **Check for Reverse Reeving:** *Hoist cable direction*
- ☐ **Check Brake System:** *Load, trolley, bridge, and hoist motor*
- ☐ **Check Trolley Travel**
- ☐ **Check Bridge Travel:** *Make sure limits and stops are in place and working. Make sure nothing is in the way of load to be lifted during travel.*
- ☐ **Check Hoist Gearing System:** *Any unusual noises*
- ☐ **Check Rails During Operation:** *Loose bolts, rail clamps, unusual wear*
- ☐ **Check Lubrication:** *Leaks, excess grease*
- ☐ **Review Weight Limits:** *Scale must be used if lift weight is unknown*
- ☐ **Inspect Rigging Equipment to be Utilized:** *Slings, shackles, rope guides, use personnel protective equipment*
- ☐ **No Defects Noted**

Note: Personnel using BNL material handling equipment shall be a current holder of a *Safety Awareness Certificate* (SAC Card).

Caution: If any malfunction or any unusual noises, STOP using the Crane/Hoist and contact Leadman, Supervisor, or ESH Coordinator immediately.

Use Back of The Checklist to Describe Defects
This Form Shall Be Kept on File And Be Available For All Inspections

Appendix C: Frequent Inspection Guide for Forklifts (Internal Combustion)
(Daily or Before Each Use)

Instructions:
Use this guide for frequent inspections(befors, during and after operation) of forklifts.

OPERATORS PRE-USE SAFETY INSPECTION CHECKLIST
ELECTRIC LIFT TRUCK

Operator must make the visual checks listed below before operating this vehicle.

ITEM	NA*	OK	Faulty
1. Fluid Leaks: Under Truck			
2. Data Plate: Attached / Legible			
3. Wheels and Tires: Condition			
4. Chain: Condition / Proper Tension			
5. Hydraulic Hose: Condition / Leaks			
6. Chain and Hose Guards: In Place			
7. Mast Cap Bolts: In Place / Secure			
8. Safety Stops and Latches: In Place			
9. Forks: Conditions / Tips Even			
10. Forks: Ground Clearance at Heel			
11. Fork Positioning Latches: In Place / Proper Tension			
12. Carriage Teeth: Condition			
13. Overhead Guard: In Place / Condition			
14.			
15.			
16.			
17.			
18.			
19.			
20.			

NA = Not Applicable

REMEMBER: Tag Out Faulty Vehicle and Contact Supervisor

Forklift Safety Inspections: A Team Effort

(Complete Both Sides)

OPERATORS PRE-USE SAFETY INSPECTION CHECKLIST
ELECTRIC LIFT TRUCK

Operator must make the visual checks listed below before operating this vehicle.

ITEM	NA	OK	Faulty
1. Neutral Safety Switch: Operating			
2. Horn			
3. Backup Alarm			
4. Head Lights			
5. Turn Signals			
6. Wiper(s)			
7. Warning Light			
8. Foot Brake: Pedal Holds/Smooth Stop			
9. Parking Brake: Holds Against Accel.			
10. Directional Controls: Smooth Operation.			
11. Motor Noise: Normal			
12 Emergency Battery Disconnect			
13. Dash Gauges			
14. Battery Voltage: In Operating Range			
15. Steering			
16 Lift Mechanism: Smooth Operation			
17. Tilt Mechanism: Smooth Operation			
18. Side Shifter: Smooth Operation			
19. Fluid Leaks: Under Truck/ Near Hoses			
20. Deadman Seat Brake			
21.			

NA = Not Applicable

REMEMBER: Tag Out Faulty Vehicle and Contact Supervisor

Forklift Safety Inspections: A Team Effort

(Complete Both Sides)

Appendix D: Frequent Inspection Guide for Forklifts (Electric)
(Daily or Before Each Use)

Instructions:

Use this guide for frequent inspections(before, during and after operation) of forklifts.

OPERATORS PRE-USE SAFETY INSPECTION CHECKLIST ELECTRIC LIFT TRUCK

Operator must make the visual checks listed below before operating this vehicle.

ITEM	NA*	OK	Faulty
1. Fluid Leaks: Under Truck			
2. Data Plate: Attached / Legible			
3. Wheels and Tires: Condition			
4. Chain: Condition / Proper Tension			
5. Hydraulic Hose: Condition / Leaks			
6. Chain and Hose Guards: In Place			
7. Mast Cap Bolts: In Place / Secure			
8. Safety Stops and Latches: In Place			
9. Forks: Conditions / Tips Even			
10. Forks: Ground Clearance at Heel			
11. Fork Positioning Latches: In Place / Proper Tension			
12. Carriage Teeth: Condition			
13. Overhead Guard: In Place / Condition			
14.			
15.			
16.			
17.			
18.			
19.			
20.			

NA = Not Applicable

REMEMBER: Tag Out Faulty Vehicle and Contact Supervisor

Forklift Safety Inspections: A Team Effort

(Complete Both Sides)

OPERATORS PRE-USE SAFETY INSPECTION CHECKLIST ELECTRIC LIFT TRUCK

Operator must make the visual checks listed below before operating this vehicle.

ITEM	NA	OK	Faulty
1. Neutral Safety Switch: Operating			
2. Horn			
3. Backup Alarm			
4. Head Lights			
5. Turn Signals			
6. Wiper(s)			
7. Warning Light			
8. Foot Brake: Pedal Holds/Smooth Stop			
9. Parking Brake: Holds Against Accel.			
10. Directional Controls: Smooth Operation.			
11. Motor Noise: Normal			
12 Emergency Battery Disconnect			
13. Dash Gauges			
14. Battery Voltage: In Operating Range			
15. Steering			
16 Lift Mechanism: Smooth Operation			
17. Tilt Mechanism: Smooth Operation			
18. Side Shifter: Smooth Operation			
19. Fluid Leaks: Under Truck/ Near Hoses			
20. Deadman Seat Brake			
21.			

NA = Not Applicable

REMEMBER: Tag Out Faulty Vehicle and Contact Supervisor

Forklift Safety Inspections: A Team Effort

(Complete Both Sides)

Appendix E: Frequent Inspection Guide for Aerial Lifts

Frequent Inspection Guide for Aerial Lifts
(Daily or Before Each Use)

Equipment:	Location:
Operator:	Date:

Instructions:

(1) Use this guide for frequent inspections (before, during, and after operation) of BNL aerial lifts.

(2) This guide can be used to document safety deficiencies found during the inspections.

(3) Operator must be qualified to operate equipment and have a current BNL *Safety Awareness Certificate (SAC Card)*.

(4) Safety harness or body belt must be WORN during operations

(5) If any malfunction or unusual noises occurs, STOP using the equipment and CONTACT SUPERVISOR IMMEDIATELY

AERIAL LIFT GENERAL APPEARANCE	load rating chart; proper placarding of controls; working gauges; operators manual; guard rails; gates; frame rails for weldment breaks; cut or worn tires; structural damage to equipment
AERIAL LIFT CARRIER	all fluid levels in engine; transmission; radiator; belts; batteries; electrical system; caster swivel wheel assemblies
CARRIER DRIVE TRAIN	front and rear axles for leaks; springs; brake system; steering system; positive lock on brake
OUTRIGGER	hydraulic leaks; floats; pins and keepers; holding valves; upper and lower operating controls
HYDRAULIC BOOM	leaks; boom travel; hinge pins; wear/roller pads; hydraulic hose reel and boom for cracks
LATTICE FRAME	frame lacing; structure; limit switches; stops
WIRE ROPE AND SHEAVES	sheaves; hoist rope; swivels; rope reeving; rope anchoring
PLATFORM FALLING CHAINS	chain condition; sprockets; brakes
BOOM HOIST	hydraulic leaks; wire rope ends; rope anchoring; brakes; clutches; controls
COUNTER WEIGHT	mounting bolts
SAFETY ITEMS	back-up alarms; level indicator; load indicator; load charts; all lights; horn

Safety Hazard Deficiencies (or other comments): . . . . . .
. . . . . .
. . . . . .
. . . . . .
. . . . . .

Appendix F: Hoist Inspection Report
(By Plant Engineering division Hoisting & Rigging Inspector)

HOIST INSPECTION REPORT

Bldg. No.:	Hoist Model	Hoist S/N:
Inspected By:		Date:

HOOKS	Yes	No
Retaining Hardware Loose	☐	○
Cracks	☐	○
Excessive Wear	☐	○
Bent	☐	○
Spreading	☐	○
Freely Rotate	○	☐
Latch Damaged	☐	○

CABLE	Yes	No
Broken Wires at Ends	☐	○
Broken Wires Excessive	☐	○
Excessive Wear	☐	○
Kinked or Distorted	☐	○
Corrosion	☐	○
Heat Damage	☐	○

CHAINS	Yes	No
Binding	☐	○
Cracked	☐	○
Twisted	☐	○
Distorted	☐	○
Corroded	☐	○
Excessive Wear	☐	○
Worn Chain Guides	☐	○

BRAKES		
Motor Brake Worn or Not Operating	☐	○
Excessive Loadbrake Drift or Backlash	☐	○
Excessive Disc Wear	☐	○

WIRING		
Loose Connections	☐	○
Frayed	☐	○
Damaged	☐	○
Proper Grounding	○	☐

DRUM & SHEAVES		
Worn Excessively	☐	○
Cracked or Scored	☐	○
Bearing Noise	☐	○

LIMIT SWITCHES		
Operating Properly	○	☐

OVERLOAD DEVICE		
Operating Properly (Limit Clutch)	○	☐

COLLECTORS		
Binding	☐	○
Excessive Wear	☐	○

HOUSING		
Distorted	☐	○
Cracks	☐	○
Loose Hardware	☐	○

OPERATION CONTROLS		
Contactor Pitting	☐	○
Operating Properly	○	☐
Damaged Push Button Housing	☐	○

LUBRICATION		
All Points Lubricated as Given in Lube Chart	○	☐
Oil Dark or Low	☐	○
Oil Leaks	☐	○

SUPPORTING STRUCTURE		
Continued Ability to Support Imposed Loads	○	☐
Worn or Distorted Trolley Parts	☐	○

AIR SYSTEM		
Leaking	☐	○
Loose Connections	☐	○
Broken Control Pendant	☐	○

WARNING LABELS		
Missing	☐	○
Illegible	☐	○

NOTE: If any checked boxes (☑), the hoist should not be operated until repairs have been made.

Remarks and Repairs made: .....

(continue comments on back if necessary)

Appendix G: Overhead Building Crane Inspection Report
(By PE Hoisting & Rigging Inspector)

OVERHEAD BUILDING CRANE INSPECTION REPORT

Crane No.:	Bldg. Loc.:	Inspected by:	Date:

CHECK COLUMN	OK	Needs Lubrication	Needs Adjustment	Needs Replacement	Needs Cleaning	Noisy	Loose	Bent or Broken
BRIDGE								
Alignment								
Girders (Camber)								
Rails								
Walk, Ladders, Railings								
Truck to Girder Connection								
Trucks								
Wheels, Driver								
Wheels, Idler								
Wheel Bearings								
Axles & Couplings								
Squaring Shaft								
Squaring Shaft Bearing								
Squaring Shaft Couplings								
Motor Coupling								
Motor Pinion								
Motor Gear								
Axle Pinion								
Axle Gear								
Gear Case Bearings								
Hydraulic Brake								
Brake Linings								
TROLLEY DRIVE								
Wheels, Driver								
Wheels, Idler								
Wheel Bearings								
Axles & Couplings								
Motor Coupling								
Motor Pinion								
Motor Gear								
Axle Pinion								
Axle Gear								
Gear Case Bearings								

CHECK COLUMN	OK		Needs Lubrication		Needs Adjustment		Needs Cleaning		Noisy		Loose		Bent or Broken	
HOIST	M	A	M	A	M	A	M	A	M	A	M	A	M	A
Hook														
Hook Bearing														
Sheaves														
Sheave Bearings														
Equalizer Sheave														
Rope														
Rope Anchor														
Drum Grooving														
Drum Oil-seal														
Drum Shaft														
Drum Shaft Bearing														
Motor Pinion														
Motor Gear														
Intermediate Pinion														
Intermediate Gear														
Drum Pinion														
Drum Gear														
Hoist Case Bearings														
Mechanical Load Brake														
Friction Discs														
Pawl														
Pawl Shifter														
Ratchet or Band														
Motor Coupling														
Hoist Case Coupling														
Cable Reel														
Springs														
Sprockets														
Chain														
Contact Fingers														
Collector Rings														

Comments: .....

.....

.....

(continue comments on back if necessa

Appendix H: Periodic Inspection Report for Forklifts
(By Plant Engineering Division Hoisting and Rigging Inspector)

PERIODIC INSPECTION REPORT FOR FORKLIFTS

Lift Truck No.:	Date:	Mechanic Name:	Hour Meter:

Inspection Items: 150 Hours of Operation or Every 12 Months

Internal Combustion

Engine
- ☐ Choke
- ☐ Exhaust System
- ☐ Fuel Pump
- ☐ PCV Valve
- ☐ Tune up: as required
- ☐ Belts

Filters
- ☐ Oil Filter
- ☐ Fuel Filter
- ☐ Air filter

Transmission
- ☐ Transmission Fluid
- ☐ Neutral Safety Switch
- ☐ Seat Safety Control

Hydraulic
- ☐ Oil Tank Level
- ☐ Oil Tank Breather
- ☐ Hoses
- ☐ Filter

Cooling
- ☐ Pressure Cap
- ☐ Coolant
- ☐ Radiator Service
- ☐ Water Pump
- ☐ Hoses

Propane Power
- ☐ Propane Cylinder Bracket

Electric

Battery
- ☐ Voltage
- ☐ Emergency Disconnect
- ☐ Lift Interrupt Switch

Drive Control
- ☐ Clean Controller
- ☐ Contactor Air Gap
- ☐ Contactor Circuits
- ☐ Contactor Connections

Drive Motor
- ☐ Clean
- ☐ Amperage Draw
- ☐ Brush & Spring Tension
- ☐ Electric Cables
- ☐ Commutator

Pump Motor
- ☐ Clean
- ☐ Amperage Draw
- ☐ Brush & Spring Tension
- ☐ Electric Cables
- ☐ Pump Coupling
- ☐ Voltage

All Lift Trucks

Wheels
- ☐ Tire pressure
- ☐ Tire Condition
- ☐ Wheel Bearings

Steering
- ☐ Fluid Reserve
- ☐ Gear Box level
- ☐ Tie Rods & Drag Link
- ☐ Pins & Knuckles
- ☐ Quadrant Center Pin

Electrical
- ☐ Battery
- ☐ Starter
- ☐ Alter./Reg./Gen.
- ☐ Head Lights
- ☐ Warning Lights
- ☐ Horn
- ☐ Heater
- ☐ Wiper(s)
- ☐ Hour Meter

Upright & Carriage Assembly
- ☐ Roller & Pins
- ☐ Frame Attachment Points
- ☐ Tilt Cylinder Linkage
- ☐ Safety Stops & latches
- ☐ Cylinder Caps
- ☐ Cross Head & Guides
- ☐ Cross Head Rtng. Bits.
- ☐ Carriage Wear
- ☐ Chain Guards
- ☐ Hose Guards
- ☐ Carriage Indexes
- ☐ Upright Cylinder Clamp
- ☐ Operational check

Brakes
- ☐ Brake Fluid
- ☐ Foot Pedal Travel
- ☐ Parking or Micro Brakes
- ☐ Wheel Cylinders
- ☐ Master Cylinder

Forks
- ☐ Sharp Edges / Cracks
- ☐ Distortion
- ☐ Heel Wear
- ☐ Mounting Clips

Yearly Inspection Items

☐ **Wheel Bearings:** remove, clean, inspect, reassemble

☐ **Brakes:** internal inspection

☐ **Chain Anchor Assembly:** inspection

Inspection of Forks: 2000 Hours of Operation or Every 3 Years

	Heel Wear		Mounting Clips	
Fork No.:	☐ Accept	☐ Reject	☐ Accept	☐ Reject
Fork No.:	☐ Accept	☐ Reject	☐ Accept	☐ Rehject

Comments: .....

(continue comments on back if necessary)

Appendix I: Mobile Crane & Boom Truck Inspection Report
(By Plant Engineering Division Hoisting and Rigging Inspector)

Mobile Crane & Boom Truck Inspection Report

Dept/Div:	Equip. No.:	Date:
Name:	Life No.:	

Item	NDF*	SR*	Item	NDF*	SR*
GENERAL			**CARRIER**		
Appearance			Tire Condition		
Paint			Brakes		
Cab			Steering		
Fire Extinguisher (5 BC min.)			Outriggers		
Glass			Glass		
Safety Galss Used			Controls		
Boom			Fire Extinguisher (5 BC min.)		
Angle Indicator			Serial No.		
Load Indicator			**BOOM**		
Load Charts			Number or Type		
Grease / Oil Leaks			Length		
CARRIER & CRANE ENGINE			Tagline		
Oil Level & Condition			Sections		
Hour Meter			Damage		
Operating Conditions			Boom Stops		
Cooling System			Auto Boom Stops		
Anti-Freeze			Auto Mast Stop		
Battery Condition			**GANTRY SHEAVES**		
Air System			Condition		
Preesure			Pendants Lubed		
Engine Instruments			Condition		
All Guards in Position			Load Block		
DRAW WORK			Capacity		
Boom Hoist			Condition		
Clutch			Hook		
Brake			Safety Latch		
Pawl			Jib		
Swing Shaft			Length		
Clutches			Condition		
Brake			**WIRE ROPE**		
Drum Shaft			Kinks, Broken Strands, Abuse		
Flanges - Left hand			Jib Pendants		
Flanges - Right hand			Load Line		
Brakes - Left hand			Whip Line		
Brakes - Right Hand			Anti-two Block System		
Third Drum			Load Indicator System		
Clutch			**BOOM TRUCK CARGO BODY**		
Brake			Body Condition - Stakes		
Control Operation			Cargo Tie-down Straps		

* NDF = No Defects Found; SR = Service Required

COMMENTS: . . . . . *(continue comments on back if necessary)*

Appendix J: Periodic Inspection Report for Aerial Lifts
(By Plant Engineering Division Hoisting and Rigging Inspector)

PERIODIC INSPECTION REPORT FOR AERIAL LIFTS			
Inspector:		Date:	
Equipment:		Accept	Reject
Location:			
AERIAL LIFT GENERAL APPEARANCE	load ratings chart; proper placarding of controls; working gauges; operator's manual; guard rails; gates; frame rails for weldment breaks; cut or worn tires; structural damage to equipment		
AERIAL LIFT CARRIER	hour meters; all fluid levels in engine; transmission; radiator; belts; batteries; electrical system; caster swivel wheel assemblies		
CARRIER DRIVE TRAIN	front and rear axles for leaks; springs; brake system; steering system; positive lock on brake		
HYDRAULIC PRESSURES	check and set pressure readings to manufacture's specifications		
OUTRIGGER	hydraulic leaks; floats; pins and keepers; holding valves; upper and lower operating controls		
SCISSOR HYDRAULIC BOOM	leaks; boom travel; hinge & cylinder pins; wear / roller pads; hydraulic hose reel and welds for cracks		
LATTICE FRAME	frame lacing;.structure; limit switches; stops		
WIRE ROPE AND SHEAVES	sheaves; hoist rope; swivels; rope reeving; rope anchoring		
MAIN & EXTENDING PLATFORM CHAINS	chain condition; sprockets; brakes; bolts; shafts; floor condition; latches; cables		
BOOM HOIST	hydraulic leaks; wire rope ends; rope anchoring; brakes; clutches; controls		
COUNTER WEIGHT	mounting bolts		
SAFETY ITEMS	emergency stops; down controls; warning lights; back-up alarms; level indicator and tilt sensors; load indicator; load charts; all lights; horn		
Safety Hazard Deficiencies (or other comments):			

Subject Area: ***Lifting Safety***

Internal Combustion Engine Forklift

Effective Date: **April 2004**

Point of Contact: Lifting Safety Committee Chair

Internal Combustion Engine Forklift is provided as a Word file.

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Send a question or comment to the SBMS Help Desk
Disclaimer

Internal Combustion Engine Forklift
Pre-Start (Visual) Check Points

#	Item	N/A	OK	Fix
01	Forklift equipment # (MMC tag No.)			
02	Hour meter reading			
03	Specification nameplate			
04	Engine			
05	Battery and battery connections			
06	Belts and hoses			
07	Engine oil level			
08	Coolant level			
09	Hydraulic fluid level			
10	Fluid leaks			
11	LPG cylinder bracket and locator pin			
12	Fuel level			
13	Fuel cap and fuel splash screen			
14	Wheels and tires			
15	Hydraulic lift and tilt cylinders and hoses			
16	Chain and hose guards			
17	Mast assembly and cap bolts			
18	Lift carriage and teeth			
19	Safety stops and latches			
20	Forks and latches			
21	Back rest			
22	Overhead guard			
23	Seat belt			
24				
25				

Comments:

Operator Name: Date:

Pre-operational check points on other side

Internal Combustion Engine Forklift
Pre-Operational Check Points

#	Item	N/A	OK	Fix
01	Neutral safety switch (operating)			
02	Horn (audible)			
03	Backup alarm (audible)			
04	Headlights (functional and visible)			
05	Turn signal (functional and visible)			
06	Wiper(s) (functional and effective)			
07	Warning light (functional and visible)			
08	Foot brake (pedal holds/smooth stop)			
09	Parking brake (holds against acceleration)			
10	Clutch, gear shift & directional controls			
11	Engine noise (normal)			
12	Dash gauges (operating)			
13	Steering/turning (smooth operation)			
14	Lift mechanism (smooth operation)			
15	Tilt mechanism (smooth operation)			
16	Side shifter (smooth operation)			
17	Fluid leaks (under forklift or near hoses)			
18	Wheel/tire revolution (smooth & no bumps)			
19	Exhaust (functional and effective)			
20	Smoke, fumes, odors, vapors (normal)			
21				
22				
23				
24				
25				

Comments:

Pre-start check points on other side

Subject Area: ***Lifting Safety***

Load Test Report

Effective Date: **April 2004**

Point of Contact: Lifting Safety Committee Chair

The Load Test Report is provided as a PDF file.

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Appendix L: Load Test Report
(By Plant Engineering Division Hoisting and Rigging Inspector)

Brookhaven National Laboratory Plant Engineering Division **CRANES/HOISTS, RIGGING EQUIPMENT, AND BELOW THE HOOK LIFTING DEVICES**	
Date	
Building No.	
Equipment Manufacturer	
Equipment Location	
Equipment Model & Serial No.	
Items	
1. **Load Test Inspection Report** *Crane Hoist, & Rigging Equipment Inspection Prior to Test*	
2. **Rated Capacity**	
3. **Test Weight** *Item to be tested as per DOE Hoisting and Rigging Manual*	
4. **Equipment Operator**	
5. **Test Conducted by**	
6. **Test Witnessed by**	
7. **Group/Division Safety Rep**	
8. **Completion of Load Test** *Crane/Hoist & Rigging Equipment Inspection Upon Completion of Load Test*	
Remarks:	

Subject Area: ***Lifting Safety***

Rigging Plan Worksheet

Effective Date: **April 2004**

Point of Contact: Lifting Safety Committee Chair

The Rigging Plan Worksheet is provided as a Word file.

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Brookhaven National Laboratory
Rigging Plan Worksheet

Building #: **Job #:** **Project Title:**
Location:

Note: All lifting operations must be conducted in accordance with applicable ANSI standards and OSHA requirements.

Equipment List						
Equipment List	**Type**	**Quantity**	**Dimensions**	**Capacity**	**Configuration**	**Load**
Slings						
Shackles						
Roller/Skates						
Jacks						
Cribbing/Shoring						
Lifting Vehicles						
PPE/Hazmat						

Equipment List	Type	Quantity	Dimensions	Capacity	Configuration	Load
Transportation Vehicles						
Hoist						

Weight of Lift

Center of Gravity

Tag lines and locations of attendants

Pre-lift Meeting - Documented, attendees, content

Designated Signal Person

Designated Person In Charge (PIC)

Communication and Signals - Hand signals (see chart), emergency signal, voice communication.

Remarks:

Descriptive Drawing - Sketch of pre- and post-lift locations and encumbrances/clearances, impact on utilities (contact MMC @ ext xxxx) and capacities and protective measures where required.

Describe Method of Accomplishment - provide a written description of the operation. All lifting operations must be conducted in accordance with ANSI and OSHA requirements.

Subject Area: ***Lifting Safety***

Safety Awareness Certificate (SAC)

Effective Date: **April 2004**

Point of Contact: Lifting Safety Committee Chair

The Safety Awareness Certificate (SAC) is provided as a PDF file.

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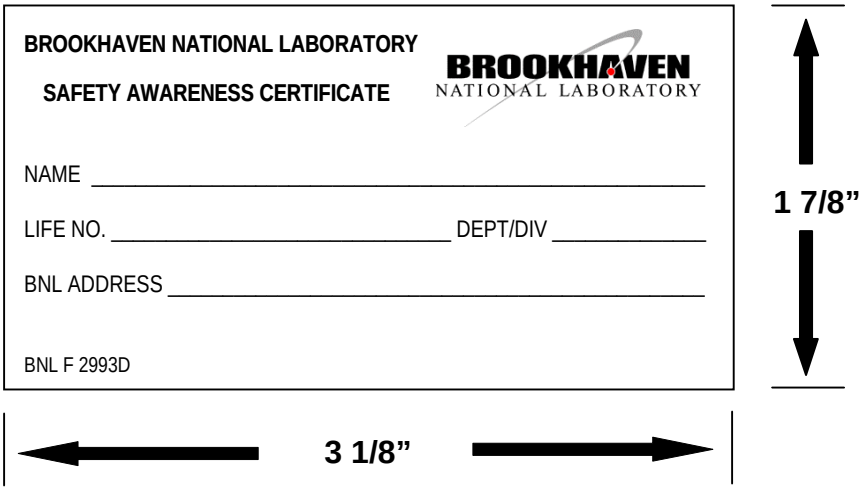
SAFETY AWARENESS CERTIFICATE (SAC)



FRONT

The person whose name appears on this card has received safety awareness training for the following classification in accordance with the Lifting Safety Subject Area.

CLASSIFICATION ☐

Equipment Category _____

Equipment Type _____ _____
Expiration Date

Evaluated By _____
(Signature on file)

Training Approved by _____
(Office of Training & Qualifications)

BACK

Definitions: Lifting Safety

Effective Date: **April 2004**

Point of Contact: Lifting Safety Committee Chair

Term	Definition
critical lifts	Lifting operations that require confirmation of engineering, or merit additional engineering input. These lifts could be either ordinary lifts or pre-engineered lifts, but with additional hazards (e.g., extremely heavy loads, confined spaces, lifting over unprotected equipment). Parts, components, assemblies, or lifting operations are so designated because the effect of their being dropped, upset, or in a collision could ✍ Result in damage which could significantly delay the work scheduled or significantly affect the program, such as the loss of vital data; ✍ Cause undetectable damage resulting in future operational or safety problems; ✍ Result in a significant release of radioactivity, other hazardous material, or other undesirable conditions; ✍ Present a potentially unacceptable risk of injury to personnel or adverse health impact (on-site or off-site); or ✍ Require exceptional care in handling because of size, weight, close-tolerance installation, and high susceptibility to damage, based on the judgment of personnel. These lifts must be made by Plant Engineering riggers or by contractors that use a professional rigging firm, or employ

	professional riggers, with exceptions to be made by the Lifting Safety Committee on a case-by-case basis. These lifts may also need engineering support as deemed necessary.
ordinary lifts	Lifts that involve the use of basic hoisting equipment, e.g., a crane or manual hoist (suspended from dedicated lifting structures such as pad eyes or runway beams) directly above the load. The load would be also required to have certified lifting points or be relatively easy to sling. Contractors working at BNL must submit a Rigging Plan Worksheet to the BNL Plant Engineering Hoisting and Rigging Inspector. The rigging plan and equipment to be used must be approved by the Hoisting and Rigging Inspector prior to use at BNL.
person-in-charge (PIC)	A PIC is appointed by the responsible manager or designee to direct critical or pre-engineered lifts. The PIC must be present during the entire lifting operation and must have experience in handling similar types of equipment. The designated PIC may be either ✍ A supervisor familiar with critical lift operations; or ✍ A person with special knowledge of the equipment and handling.
pre-engineered lifts	A lift or group of lifts that are repetitive, and which meets the definition of a critical lift. However, if it can be demonstrated through the use of tooling, fixtures, sketches, and analyses, with written procedures that the possibility of dropping, upset, or collision can be reduced to an acceptable level, as determined by the Lifting Safety committee, the lift may be designated as a pre-engineered lift.

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Send a question or comment to the SBMS Help Desk
Disclaimer

Revision History: Lifting Safety

Point of Contact: Lifting Safety Committee Chair

Revision History of this Subject Area

Date	Description	Management System
April 2004	The subject area was revised to include the following procedures: ✍ Conducting ordinary lifts and operating material handling equipment; ✍ Certifying material handling equipment; ✍ Inspecting and maintaining lifting and material handling equipment; ✍ Inspecting shielding blocks. The sections Conducting Ordinary Lifts and Operating Material Handling Equipment; Certifying Material Handling Equipment for Use; Inspecting and Maintaining Lifting and Material Handling Equipment; and Inspecting Shielding Blocks were added. The exhibit Critical Lift Plan was renamed the Critical Lift Plan and Pre-engineered Lift Procedure and	Worker Safety and Health

	Pre-engineered Lift Procedure and includes the lift plan for a pre-engineered lift. The new exhibits AGS Shielding Block 24' x 2' Roof Beam and Criteria for Resubmittal of Pre-engineered Lifts were added. The Critical Lift Evaluation Form (CLEF) was revised to reflect an increase in the load for mobile crane rated capacity from greater than 85% to greater than 95% and to include a documented Critical Lift Plan or Pre-engineered Lift Procedure in the lifting operation. The new forms Electric (DC) Motor Forklift, Inspection Reports, Internal Combustion Engine Forklift, Load Test Report, Rigging Plan Worksheet, and Safety Awareness Certificate (SAC) were added. This subject area revision replaces the remaining parts of ES&H Standard 1.6.0, Material Handling: Equipment & Procedures. It also replaces ES&H Standard 1.6.1, Material Handling: Operator Training and Qualifications.	
May 2002	The subject area describes the procedures for conducting critical and pre-engineered lifts at BNL. It also defines the requirements for conducting these lifts. It discusses the procedures for - Conducting a lift assessment to determine the type of lift; - Preparing a Critical Lift Evaluation Form (CLEF) and a Critical Lift Plan; - Reviewing and approving the plan. This subject area meets the requirements of DOE Standard Hoisting and Rigging (DOE-STD-1090-2001).	Worker Safety and Health

	and it replaces parts of ES&H Standard 1.6.0, Material Handling: Equipment & Procedures that described critical and pre-engineered lifts.	

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